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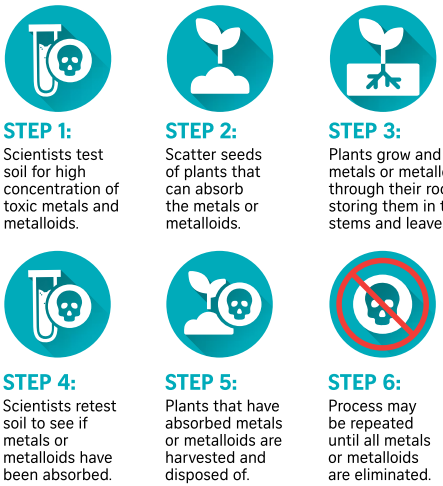
12 tropical plants in Singapore remove toxic metals from soil

Pilot using findings of local research begins at industrial land in the north of island

How plants remove toxic heavy metals and metalloids from soil

Researchers from Nanyang Technological University and the National Parks Board have demonstrated that 12 plant species can remove toxic heavy metals and metalloids such as lead and arsenic from contaminated soil. The joint research team is currently testing the plants on plots of land around Singapore to determine their effectiveness in an urban setting.



NTU researchers presenting some plants found to have the ability to remove toxic metals and metalloids from contaminated soil.

Source: NTU
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STRAITS TIMES GRAPHICS

Ang Qing

Plants readily found in Singapore are now being tapped to clean the soil of toxic contaminants, with 12 tropical species identified to take on the job.

Since the start of the month, a pilot to remove heavy metals and metalloids using over 100 tropical plants has begun at industrial land in the north of Singapore.

The three-month pilot uses the findings from an islandwide study published in February by researchers from Nanyang Technological University (NTU) and the National Parks Board.

The study identified 12 plant species that can effectively extract metals and metalloids potentially toxic to humans.

Although the plant-based method has been deployed in some wetlands here, the study paves the way for a sustainable approach of using a palette of naturalised or native vegetation that has minimal impact on ecosystems, said Professor Lam Yeng Ming, chair of NTU's School of Materials Science and Engineering, yesterday.

This is particularly relevant for a small nation like Singapore, where industrialised land may be repurposed to support new development plans, she noted.

Associate Professor Tan Swee Ngin, from the Academic Group of Natural Sciences and Science Education at NTU's National Institute of Education, said that during the study, such plots were found to contain higher levels of heavy metals and metalloids, which could affect the environment as well as the health of flora and fauna.

While elements such as cadmium, arsenic and lead occur naturally in soil, these can reach higher levels over a long time due to metal particles from air pollution, domestic sludge and synthetic products like pesticides and batteries.

The method proposed by the study harnesses phytoremediation, which removes pollutants using plants that can absorb heavy metals through their roots.

Phytoremediation serves as a more environmentally friendly alternative compared with industrial methods like soil washing and acid leaching, said Prof Lam, adding that these approaches risk negatively affecting soil health and exposing humans, plants and animals to heavy metals.

The team is also working on recovering metals and metalloids from discarded plants, in a bid to contribute to the circular economy, she said.

Worldwide, phytoremediation has been used in countries such as the United States, Ukraine and Zambia. In 1996, for instance, wild grasses were used to remove radioactive waste near the Chernobyl power plant in Ukraine.

Prof Tan said that while the method has existed for decades, overseas studies tend to involve foreign plants, some of which may not survive in Singapore's climate.

Through a field survey involving 46 tropical plant species tested with soil collected from nature parks and industrial sites, the team identified 12 plants, including an aquatic species. Among them is the cow grass (*Axonopus compressus*) native to South America that is commonly seen in gardens and parks.

It has the potential to accumulate multiple elements, including cadmium and antimony.

The method, however, can take between months and half a year, depending on the extent of pollution, said Prof Tan. To help improve plant growth and uptake of contaminants, the team is testing the incorporation of inorganic particles into these plants.

In the coming months, members of the public who wish to use the plants to cleanse soil can look forward to a pictorial guide released by the research team.

aqing@sph.com.sg